CLAIMS

What is claimed is:

1. A method for sealing an active area of a surface acoustic wave(SAW) device on a wafer, the method comprising:

providing a sacrificial material over at least the active area of the SAW device;

depositing a seal coating over the wafer so that the seal coating covers the sacrificial material; and

replacing the sacrificial material with a target atmosphere.

2. The method of claim 1, wherein the seal coating is of a sufficient impermeability so as to hermetically seal the target atmosphere within a pocket.

3. The method of claim 1, wherein providing the sacrificial material comprises:

depositing the sacrificial material over the wafer; and

lithographically patterning the sacrificial material so that the sacrificial material is over at least the active area of the SAW device.

4. The method of claim 1, wherein the sacrificial material comprises a material from a group of materials consisting of polysilicon, amorphous silicon, and polymeric material.

5. The method of claim 1, wherein the seal coating comprises a material from a group of materials consisting of silicon dioxide, silicon nitride, or metal.

6. The method of claim 1, wherein the seal coating comprises a glassy material.

7. The method of claim 6, wherein the glassy material is from a group of glassy materials consisting of spin-on-glass and sputtered glass.

8. The method of claim 1, wherein replacing the sacrificial material comprises:

lithographically patterning the seal coating to create a via through the seal coating and to expose electrical contact pads for the SAW device;

etching a sacrificial material by way of the via to create a pocket surrounded by the seal coating;

placing the wafer in the target atmosphere; and

filling the via to seal the target atmosphere in the pocket.

9. The method of claim 8, wherein etching the sacrificial material comprises an etching process that does not leave substantial residue.

10. The method of claim 9, wherein the sacrificial material comprises a silicon-based material, and wherein the etching process comprises placing the wafer in a xenon-difluoride atmosphere to dry etch the silicon-based material.

11. The method of claim 8, further comprising:

allowing an atmosphere in the pocket to equilibriate with the target atmosphere prior to filling the via.

12. The method of claim 8, wherein filling the via comprises sputtering of a fill material until the via is filled, and wherein the via is placed to avoid the active area of the SAW device.

13. The method of claim 8, wherein filling the via comprises evaporating a fill material until the via is filled, and wherein an angle between evaporating beam and wafer surface is sufficiently low to avoid introducing a substantial amount of the fill material into the pocket.

14. The method of claim 1, further comprising:

building up electrodes connected to contact pads of the SAW device.

15. The method of claim 14, wherein the wafer is subsequently diced to produce individual die and acceptable die are placed into a surface-mount-device tape-and-reel for subsequent printed circuit board mounting.

16. The method of claim 1, wherein the active area comprises a wave propagation area of the SAW device.

17. A surface acoustic wave (SAW) device sealed at the wafer level, the device comprising:

an active area to be protected;

an electrical contact area; and

a lithographically-formed structure sealing at least the active area and leaving at least a portion of the electrical contact area exposed.

18. The device of claim 17, wherein the lithographically-formed structure comprises a glassy material.

19. The device of claim 17, wherein the SAW device is fabricated on a substrate from a group of substrates consisting of lithium tantalate, lithium niobate, and quartz.

20. A lithographically-fabricated surface acoustic wave (SAW) device, the SAW device comprising:

means for carrying a surface acoustic wave; and

a wafer-level means for sealing the means for carrying the surface acoustic wave.